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ABSTRACT

The basic goal of this study was to examine the relationship that a number of hypothesized variables had to the systemwide persistence of students enrolled in bachelors degree programs at four-year postsecondary institutions. Data were from the Beginning Postsecondary Students longitudinal database of the National Center for Education Statistics for 3,278 students. The theoretical framework relied on V. Tinto's model of student departure, J. Bean's model of student attrition, and A. Astin's theory of involvement. Fifteen variables were measured. Results from the original hypothesized eclectic model to explain system persistence indicated that the model was not consistent with the data, and that the variables and the causal relationships defined by the model were not altogether plausible. The model was modified, while staying within the framework of the literature on attrition. The modified version provided adequate goodness-of-fit indices. In the model, the effect of initial educational aspiration on persistence was realized completely through intermediary variables. Of the background and demographic variables in the model, socioeconomic status, age, and academic ability (Scholastic Assessment Test score) had significant total effects on 5-year system persistence. Direct and indirect effects were identified. Other variables that helped explain system persistence were percentage of full-time attendance, hours worked at a job, scholastic achievement, and student involvement. (Contains 3 figures, 1 table, and 56 references.) (SLD)

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FACTORS RELATED TO THE "SYSTEM" PERSISTENCE OF STUDENTS SEEKING THE BACHELOR'S DEGREE AT FOUR-YEAR INSTITUTIONS.

(Paper for presentation at the 2002 AERA Annual Meeting)

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FACTORS RELATED TO THE "SYSTEM" PERSISTENCE OF STUDENTS SEEKING THE BACHELOR'S DEGREE AT FOUR-YEAR INSTITUTIONS

Background: Area of Concern

Although there has been a substantial amount of research in the area of student retention and persistence in higher education (Astin, 1975; Bean, 1990; Pascaralla & Terenzini, 1991; Tinto, 1993), most studies have focused on institutional departure and retention which, as it turns out, is not the same as the retention of students in the system of higher education as a whole ("system persistence"). Students departing from a given institution could be leaving education altogether (i.e. dropouts), but they could also be headed to other potential fates such as transferring to a different institution (transfers), or just temporarily leaving to return to the persistence path at a later time (stop outs). The potential benefits of persisting and completing a degree in higher education will most likely be reaped by students irrespective of whether the degree was completed at the initial institution, or after transfer to another institution for final matriculation. Understanding the characteristics of students who successfully transition through higher education by these various paths can further expand current knowledge of persistence and attrition in postsecondary education.

There is substantially less information regarding the retention rates within the system of higher education as a whole (i.e. "system" persistence). As might be expected, persistence and completion rates are higher when students are followed despite whether they have transferred or stopped out temporarily (Adelman, 1998). For students beginning at four-year institutions, bachelor degree *completion* rates (independent of path) range from 53% to 65% depending on what the parameters of the study were and whether the students were assessed after five, six, or more years. If one includes students still enrolled with those who have already completed bachelors degrees, then the *system* persistence rates are somewhat higher again, depending

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on which study was consulted and on how long the students were followed (National Center for Educational Statistics [NCES], 1997; Porter, 1990; Tinto, 1993).

The theoretical models posited to explain student persistence and departure behavior in higher education have focused almost entirely upon institutional, as opposed to system-wide departure behavior (Bean, 1990; Cabrera, Castañeda, Nora, & Hengstler, 1992; Milem & Berger, 1997; Tinto, 1993). The extent to which these models explain the behaviors and causal factors which might predict whether a student persists (or ceases to persist) through the system of higher education has not been established. Despite this fact, these models of *institutional* departure behavior can form the basis from which to investigate further student persistence in the *system* of higher education (Munro, 1981).

Purpose Within the Theoretical Perspective

The basic goal of this study was to examine the relationship that a number of hypothesized variables had to the *system-wide* persistence of students enrolled in bachelor's degree programs at 4-year postsecondary institutions. Enhancing the current body of knowledge in this way would help to determine whether the current theoretical models posited to explain institutional persistence (or portions of the models), could be applied to explain system persistence. In order to accomplish this goal, this study utilized the *Beginning Postsecondary Students* (BPS) longitudinal database from the National Center for Educational Statistics (NCES, 1994, 1996), which includes a nationally representative sample of students from various geographical regions and types of institutions. The data for this study were collected over a five-year period beginning in the fall of 1989, when the students in the sample initially began their postsecondary education. The longitudinal study followed the students irrespective of whether they had remained at their initial four-year institution, had transferred to another institution of

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higher education, temporarily had left the persistence path, or had departed from higher education altogether.

The underlining rationale of this investigation was to incorporate what appeared to be the most promising constructs and variables from each of three theories dealing with persistence and achievement of students in higher education as offered by Vincent Tinto (1975, 1993), John P. Bean (1980, 1983, 1990), and Alexander W. Astin (1975, 1984, 1993). Within this framework, the purpose of this study was to (a) determine whether selected variables and the relationships between them as proposed in an hypothesized eclectic model to explain system persistence would be consistent with the observed data (i.e., have adequate goodness-of-fit indices), or if not, (b) whether a systematically modified model could be developed which would be consistent with the data and make a case for the plausibility of the postulated relationships between the variables.

Delimitations

The following delimitations were applicable to this study: (1) The study sample was restricted to those students who had begun their postsecondary education at four-year institutions during the 1989-1990 academic year, and who had as a minimum, an initial goal to complete a bachelor's degree, (2) The variables utilized in this study were limited to those available through the *Beginning Postsecondary Students* longitudinal study database, and (3) The study sample included only those students for whom information regarding their five-year persistence status was available.

Definition of Key Terms

Four-year Institutions: For the purpose of this study, four-year institutions represents institutions of higher education that grant at least baccalaureate degrees.

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5-year System Persisters: Refers to students who had either completed or were still enrolled in a four-year institution after five years from beginning regardless of whether they transferred from their initial institution or temporarily "stopped-out". Enrollment at either the full-time or part-time basis qualified as persistence.

5-year System Non-Persisters: Students were considered non-persisters if ,after five years, they were no longer attending a four-year institution and had not completed a bachelor's degree. For the purposes of this study, students who transferred in a reverse fashion to a two-year institution and did not return to the four-year institution were considered system non-persisters regardless if whether they did or did not complete a two year degree program.

The Theoretical Framework

Tinto's Model of Student Departure

Vincent Tinto's model of student departure builds upon the work of Spady and furnishes a framework for understanding the causes of student attrition at institutions of higher education (Spady, 1970, 1971; Tinto, 1975, 1986). Like Spady, Tinto derived essential components of his model from of student departure from the work of Emile Durkheim (1951) who theorized on suicidal behavior (Spady, 1970; Tinto, 1975, 1993). Accordingly, Tinto found an analogy to Durkheim's contention that "egotistical suicide behavior" is preceded by an inability of an individual to integrate socially and intellectually into society successfully, and postulated that successful integration into the academic and social communities of the college campus is paramount for continued persistence in higher education (Tinto, 1975, 1993).

Tinto also drew upon the theoretical works of the Dutch social anthropologist, Arnold Van Gennep (1960), who studied the various stages (i.e., separation, transition, and incorporation) an individual in tribal societies pass through in order to obtain social membership as an adult in society. Tinto embraced these concepts as a framework for understanding the process of

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students evolving to the stage of incorporating and integrating into the academic community (Tinto, 1986,1993).

According to Tinto's theory, students enter college with given background characteristics (i.e., SES, various individual attributes, and pre-college educational achievements), and a level of commitment toward their goals and intentions. This, plus an initial commitment or affinity to the institution, will impact students' integration into the academic and social systems of the college community. Tinto theorizes that successful integration serves to further shape and reinforce subsequent academic goals and institutional commitments, which in turn, promotes persistence within the institution (Tinto, 1975, 1993). Tinto's model focuses on voluntary departure from a single institution. It is not intended to explain the behavior of students who persist via transferring to other institutions, or of those who "stopout" of college temporarily to return and to persist at a later time.

Bean's Model of Student Attrition

John P. Bean (Bean 1980, 1983, 1990) also developed a causative model of student attrition from institutions of higher education. From a slightly different theoretical perspective, he made an effort to incorporate organizational and environmental factors into his model of student attrition (Bean, 1990; Pascarella & Terenzini, 1991). Bean utilized the Price/Mueller model of employee turnover behavior to help explain components of student departure behavior from higher education (Bean,1980, 1983; Price ,1977; and Price & Mueller,1981). In drawing from this model, Bean postulated that organizational factors in educational institutions would affect student departure behavior much in the same way that organizational factors affect employee turnover behavior in the workplace. He also derived from the Price/Mueller model the concept that the experiences of an individual will have an impact on subsequent attitudes, which, in turn, can lead to departure behaviors (Bean, 1980, 1983, 1990).

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Employee turnover models also provided Bean with the insight to include "environmental" or external variables in his theory (Bean, 1982; Price & Mueller, 1981). Bean postulated that environmental "pull" factors, such as outside relationships, responsibilities, and work roles could interfere with a student's academic and social interactions within the campus organization, and therefore effect student persistence.

Similar to Tinto, Bean also considered background characteristics of a student, such as educational goals and aspirations, academic ability, and parental characteristics as necessary components in understanding the causes of student departure behavior. Bean postulated that background characteristics, organizational and environmental factors, and academic and social interactions within the campus community have direct and indirect effects on various intervening attitudinal variables (including student satisfaction, and intention to leave), and educational outcomes (i.e., GPA), which, in turn, effect the students' perception of institutional fit and loyalty, and ultimately impact continued enrollment (Bean, 1990; Pascarella & Terenzini, 1991).

Astin's Theory of Involvement

Although Alexander W. Astin draws from a broader theoretical perspective that is intended to explain a variety of educational outcomes, much of his work has focused on student retention issues in higher education (Astin, 1975, 1984, 1993).

Astin has used the general input-process-output concept as a framework to develop the Input-Environment-Output (I-E-O) model which focuses on interactions as defined within an environment (Astin, 1993; Pascarella & Terenzini, 1991). Accordingly, students enter postsecondary education with different "input" variables, such as ability, SES, and gender. Given these background characteristics, it is the various interactions and experiences that occur between students and their environment (e.g., interactions with faculty and students, studying, and going to class) while attending postsecondary education that subsequently shape and affect

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their educational outcomes. In agreement with this model, Astin developed a *Theory of Involvement* which maintains that the extent to which students experience various interactions with the environment determines the level of student involvement, which, in turn, becomes a major factor in determining whether a student eventually persists in college. (Astin, 1975, 1984, 1993).

Review of Factors Selected to Explain System Persistence

SES: The socioeconomic status (SES) of students has been shown to be positively associated with bachelor degree persistence and completion in a number of studies (Astin, 1993; Bean, 1990; Porter, 1990; Summerskill, 1962; Tinto, 1993). The effect seems to be only modest, and sometimes non-existent when other factors such as ability are controlled (Baker & Vélez, 1996). This effect can be understood to reflect the value that families from various SES groups may put on education (Summerskill, 1962), plus the financial capability to support the student to go to college (Bean, 1990; Cope & Hannah, 1975).

Age: Although most studies related to persistence in postsecondary education delimit their inquiry to include only traditionally aged students, there has been a handful of studies that have looked into the relationship between age and persistence. Summerskill (1962) summarized the literature to that point as inconsistent and concluded that age, as such, does not affect attrition although older students may encounter more obstacles as they proceed towards graduation. The concept that older students are more likely to have outside influences which, in turn, could lead to attrition is supported by the works of Astin (1975), Tinto (1993), Murtaugh, Burns, and Schuster (1999), and Ozga and Sukhnandan (1998).

Gender: The majority of the literature has indicated that there has been no appreciable difference between the dropout rates of men and women (Baker & Vélez, 1996; NCES, 1997). In a review of data from another national database, gender did not have an effect on system

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persistence in 4-year institutions (Porter, 1990). Tinto (1993) reported that females had lower attrition rates when both two-year and four-year programs were taken into account. Astin (1975) found that women were more likely to complete their bachelor's degree within four years, although he indicated that this might be partially attributable to the tendency for men to be attracted to longer degree programs (i.e., engineering).

Academic Ability: It seems reasonable that individuals with higher ability would be more likely to be successful in their pursuit of higher education. This contention seems to be supported fairly well in the literature. Student ability as measured by both high school GPA and college aptitude test scores has been shown to be a strong predictor of college completion (Astin, 1975; Summerskill, 1962; Porter, 1990; Tinto, 1993). Astin (1993) found from longitudinal studies that high school GPA was "the single strongest predictor", and that SAT scores were a "relatively strong predictor" of college completion. Cope and Hannah (1975) concurred that dropouts usually have below average scores on their aptitude tests.

Goal Aspirations: Educational aspirations at the time of entry have been shown to have a positive impact on educational attainment in a number of studies (Anderson, 1981; Astin,1975; Pascarella & Terenzini, 1991; Peng & Fetters, 1978; Tinto, 1993). According to Tinto, student educational and occupational goals have an impact on persistence, and that a student's goal to graduate college is the most influential factor after ability is taken into account (Tinto, 1975, 1993). In support of Tinto's theory, various research studies have provided fairly strong support for the proposition that initial commitment to the goal of graduation positively affects subsequent goal commitment, which in turn increases the likelihood of student persistence in college (Braxton, Sullivan, & Johnson, 1997; Pascarella & Terenzini, 1980; Stage, 1989).

Although from a theoretical point of view the construct of career aspirations would be expected also to have an effect on persistence behavior, its relationship to persistence behavior has not been studied to the same extent as that of educational aspirations. Tinto (1993) pointed

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out that when attending college is seen as a prerequisite to a larger goal such as an occupational goal, then the motivation to complete the degree program would be expected to be enhanced. He, however, also pointed out that many students experience uncertainty about their long-term educational and/or occupational goals while attending college.

Enrollment Intensity: Most of the research on attrition in higher education has been limited to studying full-time students. Research on enrollment intensity, which has been primarily focused on students attending commuter four-year and two-year institutions, has generally supported the contention that students enrolled part-time in comparison to full-time are more likely to dropout of college (Bean & Metzner, 1985). From a theoretical point of view, part-time attendance is associated with less involvement and interactions within the academic community, which, in turn, can result in negative outcomes such as dropout behavior (Astin, 1996; Pascarella, 1980).

Pull Factors: Factors external to the college that "pull" students away from participating fully in the academic and social communities of the institution will potentially have a negative effect on student outcomes and persistence.

There has been fairly strong support in the literature that full-time work, especially when it is *off campus*, has a negative impact on degree completion (Astin 1975, 1993; Pascarella & Terenzini, 1991; Tinto, 1993). The effect of part-time work on attrition has not been studied to the same extent as the effect of full-time employment on attrition. Nevertheless, part-time employment, especially when that employment is on campus, has not been generally linked to persistence problems (Pascarella & Terenzini, 1991).

Having family responsibilities has also been associated with increased withdrawal behavior. A negative relationship between family responsibilities and persistence has been supported in the literature (Bean, 1990; Bean & Metzner, 1985; Nora, Cabrera, Hagedorn, & Pascarella, 1996; Tinto, 1993).

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Student Involvement/Integration: Student involvement and integration within the academic and social aspects of the college experience are central to the theoretical models established by Tinto, Bean, and Astin. Although there are no consistent standards for using the terminology *integration* versus *involvement*, in the broader sense they can be considered to represent the same, or at least very similar constructs. Generally, those who have used Tinto's model as a foundation for research have used the term *integration* to refer to a state of being that occurs for the student via his or her interaction and involvement in the academic and social communities of the campus. It is typically assessed through measures of student's perceptions and academic achievement (the latter of which is a separate construct in this study). Astin has used the term *involvement* and in doing so has focused on the behavioral measures that quantify a student's involvement activities including interaction with faculty and peers. Bean has appeared to use the terms integration, involvement, and also interactions, but has separated behavioral and attitudinal measures, and has also kept academic achievement (GPA) as a separate construct. In the present study, the term *involvement* was used as a construct label because it was operationalized using behavioral measures.

Many studies have lent support to the contention that greater amounts of integration and involvement in the academic and social aspects of the campus community can increase the likelihood of student persistence (Astin, 1975; Bean, 1990; Berger & Milem, 1999; Cabrera et al., 1992; Lamport, 1993; Pascarella, 1980; Tinto, 1993). Some studies, however, have not supported a strong relationship between integration and persistence (Braxton et al., 1997; Ruddock, Hanson, & Moss, 1999), and some indicate that integration might play different roles for different student populations (e.g., residential vs. commuters, traditional vs. nontraditional) (Pascarella & Terenzini,1991).

As virtually all studies concerning integration and involvement have been done at the institutional level, they have related more directly to institutional than to system persistence. In

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one system-wide longitudinal study, however, Stage and Rushin (1993) interestingly found student involvement factors to have a slightly negative relationship with system persistence.

Scholastic Performance: The theoretical longitudinal model posited by Bean (1980, 1983, 1990) posits scholastic performance to have direct and indirect effects on dropout behavior. A number of studies can be cited that support the proposition that undergraduate grades have a high degree of relationship with persistence (Astin, 1993; Bean, 1990; Cabrera, Nora, & Castañeda, 1993; Murtaugh et al., 1999; Nora et al., 1996; Pascaralla & Terenzini, 1991; Peng & Fetters, 1978; Summerskill, 1962).

Satisfaction: Astin (1993) found satisfaction levels to be related to the number of college years completed, and Starr, Betz, and Menne (1972) demonstrated that a variety of student satisfaction indicators were significantly higher for those who did not dropout, when compared to those who departed either for academic reasons (i.e. academic dismissal), or nonacademic reasons (i.e. voluntary departure). Other studies have also supported the contention that satisfaction levels are negatively correlated with subsequent persistence behavior (Hatcher, Kryter, Prus, & Fitzgerald, 1992; and Mohr, Eiche, & Sedlacek, 1998). The assertion that there is an association between student satisfaction and retention suggests that student satisfaction may prove to be an important intermediate outcome for institutions to focus on in their efforts to lower attrition rates (Astin, 1993; Bean, 1980; Sanders & Burton, 1996).

Astin (1993) found a positive correlation between satisfaction measures and "left school or transferred" , implying that satisfaction may have a relationship with either or both persistence and transferring.

Transfer Status: Approximately 15% of all students attending four-year institutions have transferred at least once during their first two years, yet the persistence of these transfer students has not been extensively studied (Pascarella & Terenzini, 1991; Tinto, 1993). Even though the students at the four-year institution who transfer are presumably seeking an

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institution which will better meet their needs, most of the literature points to the fact that even horizontal transfer has a negative impact on persistence (Astin, 1975, Pascarella & Terenzini, 1991;). Carroll (1989), however, found that when horizontal transfers did not break enrollment continuity, their chances of leaving the persistence path within six years decreased.

Hypothesized Eclectic Model for System Persistence

Key tenets derived from the theoretical models posited by Tinto, Bean, and Astin were used as a basis to develop a hypothesized model to explain system persistence. The selected constructs and variables utilized in the eclectic model and the proposed relationships between them and the final dependent variable are all, except for the variable transfer status, found in these theoretical models. Transfer status is not found in these previously developed causal models because those models focused on institutional persistence, which considers students who transfer as institutional dropouts. Empirical data suggests a relationship between transferring and persistence, and therefore warrants to be included in as a variable in the theoretical framework for understanding system persistence. Variables not found in the data base could not be included.

The essential components of the hypothesized eclectic model of system persistence are presented in Figure 1.

[Insert Figure 1 Here]

Methodology

Research Sample

This study utilized the *BPS* longitudinal database from the National Center for Educational Statistics (NCES, 1994, 1996), which followed for a five-year period a cohort of

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approximately 7500 students who began their postsecondary education some time between July 1, 1989 and June 30, 1990. The design involved a multistage probability sampling of 70,000 students taken from 1,533 institutions from 121 geographical areas across the United States (NCES, 1996). The sample was further reduced as a result of ineligibility (e.g., student was not a first-time beginning postsecondary student in a 4-year institution with the goal of completing a bachelor's degree), inability to locate/contact the student, or a decision by the student not to participate in the study. This process yielded a sample of 3,278 bachelor-seeking students all of whom were beginning their postsecondary education for the first time regardless of when they had completed high school. In the group, 48.7% was males, while 51.3% was females. Their ages when they began were between 16 and 56 years, with a mean of 18.33 years. The ethnic diversity of the sample included: White, non-Hispanic (82.0%); Black, non-Hispanic (7.4%); Hispanic (5.1%); Asian/Pacific Islander (4.9%); Native American/Alaskan (0.3%); and missing (0.2%).

The areas of study for the students in this sample varied. The majors of students during their longest enrollment spell throughout the five-year period of the study were as follows: Humanities (14.0%), Social/Behavioral Sciences (18.0%), Life Sciences (7.1%), Physical Sciences (2.3%), Mathematics (1.1%), Computer/Information Technology (0.2%), Engineering (8.8%), Education (8.6%), Business & Management (20.6%), Health (6.3%), Vocational/Technical (2.1%), Other (7.3%), Missing (3.6%).

This study focused on bachelor-seeking students attending four-year institutions. Within the sample of 3,278 students used for this study, 41.1% initially attended a public, four-year institution, whereas 58.9% initially attended a private, four-year institution. Students were included in the sample regardless of whether their enrollment was on a full-time and part-time basis.

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The frequencies with which the 3278 students in the sample achieved or did not achieve five-year system persistence are as follows: 76% (n = 2492) was system persisters, and 24% (n = 786) was system nonpersisters. As mentioned previously, "system persistence" refers to students who have either completed or are still enrolled in the four-year educational system regardless of whether they transferred from their initial institution.

It is interesting to note that of the 2492 students who achieved five-year *system* persistence, 80.7% (n = 2021) did so at their initial institution, and 19.3% (n = 480) persisted after transferring to another four-year institution. For comparison purposes, this information equates into an *institutional persistence* rate of 61.7%, which is understandably lower than the *system persistence* rate of 76% reported above.

Variables and Their Measures

The following is a description of the variables and the way in which they were measured:

Gender: A dichotomous variable coded 1 for males (48.7%) and 2 for females (51.3%).

Age: A continuous variable of the subjects' ages when beginning the study which ranged from 16 to 56 years with a mean of 18.33 years.

Socioeconomic status percentile (SES): A continuous composite variable available in the BPS database from NCES that was derived by combining a variety of items including parents' education, things owned in the home, and family income.

Ability: The composite scores of SAT aptitude tests which were available for a portion of the students as a measure of scholastic ability.

Initial Educational Aspiration: An ordinal-scaled variable obtained by asking students during the first year what was the highest level of education they expected to achieve.

Subsequent Educational Aspiration: An ordinal-scaled variable obtained by asking students at the end of year three what was the highest level of education they expected to achieve.

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Career and Financial Success/Security: This composite variable was derived from the mean score of three questions asked during the initial year of the study. Students designated whether it was *very important*, *somewhat important*, or *not important* with respect to (1) Being very well off financially, (2) Having good income from the work they would do most of their life, and (3) Having job security and permanence from the work they would do most of their life. (Cronbach's alpha = .70)

Percent Months Enrolled Full-Time: A continuous variable available in the BPS database derived by NCES reflecting the percentage of months that a student attended full-time, as opposed to part-time, during the academic year while they were enrolled in postsecondary education or until first attainment.

Average Hours Worked While Enrolled: This computed continuous variable reflects the average hours a student worked per week throughout the first three years while enrolled. It included only for those months when the student was enrolled for at least part of the month.

Family Responsibilities: A composite variable (ranging from "0" to "6+") derived from the mean of the following three measures taken at year three: (a) Number of children, (b) Number of individuals besides themselves for whom the student had financial responsibility, and (c) Number of individuals besides themselves for whom the student had caretaker or other time-commitment responsibilities. (Cronbach's alpha = .80)

Involvement at Initial Institution: This composite variable was derived from the mean of six questions measuring the level of the students' involvement from the beginning of the study through year three. The six measures were coded from 4 = often per term to 1= never and included how much they (a) talked to faculty outside of class, (b) socialized with faculty/advisor, (c) participated in study groups, (d) went places with friends from school, (e) participated in school clubs, and (f) attended conventions or academic lectures. (Cronbach's alpha = .64)

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Cumulative GPA 1989-1992: Overall grade point average through year three as reported by the student. Responses were coded from 1=less than C's though 6=mostly A's.

Satisfaction at Initial Institution: A continuous variable computed by the NCES that measured the level of student satisfaction with a number of aspects regarding their *initial* institution (i.e., satisfaction with teaching ability, cost, intellectual growth, prestige, and social life). This variable was coded from 5 = satisfied with five aspects to 0 = satisfied with no aspects.

Transfer Status Through First Degree: A dichotomous variable that indicated whether a student had or had not transferred to another institution before obtaining their first degree. Transfer status was reported whether the student had attended postsecondary education continuously or non-continuously, and included both horizontal and reverse transfers.

5-year System Persistence: A dichotomous variable that summarized the status of students at the end five years with respect to whether they were or were not system persisters. Students were coded as system persisters if they either had attained a bachelor's degree or were still enrolled in a four-year institution year five. They were coded as system persisters or system nonpersisters regardless of their transfer status, or enrollment patterns.

Data Analysis

For the variables studied, descriptive statistics involving frequencies, percentages, means, standard deviations, and correlation coefficients were obtained. To determine the adequacy of the goodness-of-fit of the initial eclectic model posited to explain system persistence as a function of a variety of variables derived largely from research dealing with institutional persistence, a path diagram utilizing structural equation modeling techniques was employed. The proposed eclectic model was tested using the robust methodology of the EQS structural

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equation modeling program (Bentler & Wu, 1995) to determine whether the model was consistent with the observed data.

A systematic method of model modification was used as warranted in order to achieve a model that would be consistent with the observed data. This task was accomplished by first adding parameters (i.e., directional paths) between variables that were identified by the Lagrange Multiplier Test as parameters to add in order to improve the model's fit, and second, by then removing parameters suggested by the Wald Test as paths that did not significantly contribute to the model's fit and could therefore be removed for reasons of parsimony. Paths were added to the model only if the suggested causal relationship could be supported by the literature. It should be emphasized, however, that cross-validation studies of the modified eclectic model should be initiated with samples from diverse populations, as the modification process could have capitalized on random error.

Results

The initial eclectic model proposed to explain system persistence failed to yield acceptable goodness-of-fit indices, an outcome which indicated that the proposed model did not adequately fit the observed data and, therefore, was not supported. Ten iterations of the initial eclectic model yielded a modified version that was consistent with the observed data as substantiated by acceptable goodness-of-fit indices. Although the chi-square was significant, $\chi^2(64) = 136.29$, $p < .001$, as is common when utilizing large sample sizes, the ratio of chi-square to degrees of freedom was 2.1, which is less than 3 and therefore indicated that the modified model was consistent with the observed data (Kline, 1998). The value of the Comparative Fit Index (CFI), was .935 , which is above the acceptable standard of .90 or greater for indicating an adequate fit of the model to the data (Byrne, 1994). The Root-Mean-Square Error of Approximation (RMSEA) was .035, which is below a conventionally acceptable standard of .05 or less for this

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index (Hu & Bentler, 1999). The findings supported the adequacy of the modified eclectic model with the empirically demonstrated links between variables being illustrated in Figure 2.

[Insert Figure 2 Here]

The degree of relationships identified between the variables in the modified eclectic model is included in Figure 2. The significance of the correlations (exogenous variables only), and of the standardized path coefficients was determined by a z-test statistic at the 95% confidence level. Significant paths are indicated by an asterisk (*). The proportion of variance explained (r^2) for some of the intermediary variables and for the final dependent variable, system persistence, is also indicated on the diagram. A summary of the direct, indirect, and total effects of each variable on five-year system persistence is presented in Table 1.

[Insert Table 1 Here]

Discussion

The results from analyzing the initial hypothesized eclectic model to explain system persistence (Figure 1) indicated that the model was not consistent with the data, and that therefore, the variables and the causal relationships as specifically defined by the model were not altogether plausible. Consequently, an effort to modify the model, while staying within the framework of the empirical and theoretical literature on attrition, was warranted.

Through systematically adding paths to and subtracting paths from the initial hypothesized eclectic model, a modified version was produced which provided adequate goodness-of-fit indices (Figure 2). This outcome indicated that the variables and the relationships between them as depicted in the modified model were plausible.

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Of the seven paths that were added to the model, four of them further defined linkages from background and demographic variables to intermediary variables; two were between intermediary variables; and one established a causal link between an intermediary variable and the final dependent variable, system persistence. Of the paths that were removed from the model because they did not contribute significantly to the fit of the model, it is worthy to note that when one of them, the path from career and financial goals to involvement, was removed, it left that variable no longer linked to system persistence. This result implies that unless its effect is mediated through some unknown variable, there is little to no relationship between the variable career and financial goals and the variable system persistence as defined by the modified model. Another path worth noting as being removed was the one that directly linked satisfaction to persistence. Satisfaction, however, did remain linked to persistence via an indirect path mediated by transfer status. The percentage of variance that the modified model explained in persistence was 16.3. This percentage is within the approximate range (10% - 30%) found in other multi-institutional persistence studies (Anderson, 1981; Munro, 1981; Pascarella, 1985; Peng & Fetters, 1978).

The fact that the modified eclectic model developed to explain system persistence was consistent with the data (and thereby supported the plausibility of the postulated relationships) indicates that the tenets which were selected from the theories of Tinto, Bean, and Astin to be included in the eclectic model were effective in establishing at least an initial framework for explaining system persistence.

In utilizing this model as a framework for understanding system persistence, it should be kept in mind that although the database provided many of the key variables found in the theoretical models posited by Tinto, Bean, and Astin, it is possible that certain variables not available in the database could have potentially enhanced the "fit" of the model above and beyond what was developed in the current formulation. For example, the variables "intent to

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persist" (used by Bean), and "institutional commitment or loyalty" (used by Tinto and Bean), which are two variables that are often employed in persistence research, were not available to incorporate within this study. The extent to which this omission constitutes a weakness of the eclectic model to explain system persistence could be ascertained through additional analyses that included these (or any other potentially useful) variables.

A review of Table 1, reveals that the input variables not only fluctuated with respect to their total or complete effects on system persistence, but also varied with respect to how much the direct versus indirect effects contributed to their total effects on five-year system persistence. The two variables with the highest standardized path coefficients for total effects on persistence were "GPA" (beta = .190), followed by "subsequent educational aspirations" (beta = .176). The effects of both of these variables were primarily realized through direct contributions. The literature that has discussed the relationship between academic performance and persistence has supported the contention that undergraduate GPA is a valid predictor of persistence (Astin, 1975; Bean, 1990; Metzner & Bean, 1987; Pascaralla & Terenzini, 1991). In addition, the results indicating that there was a positive relationship between subsequent educational aspirations and persistence were consistent with a number of studies, especially those that have utilized data from multiple institutions (Braxton et al., 1997; Munro, 1981).

In reviewing the path coefficients in the current study, one can note that subsequent educational aspirations not only had a relatively high direct effect on system persistence, but also seemed to serve as an important intermediary variable in the modified model. Most noteworthy was its mediating effect in the relationship between "initial educational aspirations" and persistence. This component of the eclectic model was derived from Tinto's model of student departure, and although the casual link from initial educational aspirations to subsequent educational aspirations to persistence is not delineated in the theories posited by Bean and Astin, it does appear to help explain system persistence in the current study. Looking

at the model further (Figure 2), one can see that subsequent educational aspirations also provided important mediating effects between both GPA and persistence, and between "academic ability" (SAT score) and persistence.

In the current study, the effect of initial educational aspiration on persistence was realized completely through intermediary variables, an outcome which is consistent with most (Bean, 1990; Munro, 1981; Tinto, 1975), but not all (Astin, 1975; Bean & Metzner, 1985) of the empirical data related to student attrition.

Of the background and demographic variables included in the eclectic model, SES, age, and academic ability (SAT score) all had significant total effects on five-year system persistence (beta = .103, -.097, and .114, respectively). For SES, and to a lesser degree for age, the direct effects on system persistence were much greater than the indirect effects. Although there is evidence that background variables have a direct relationship to persistence (Braxton et al., 1997), the general concept in the theoretical models posited to explain persistence is that background variables have their impact on persistence primarily through intermediary variables (Bean, 1990; Tinto, 1993). Consistent with this premise, most of the impact of academic ability (SAT score) on persistence was through *indirect* pathways.

An observation worth noting was related to the effects of both academic ability and gender on system persistence. In both cases, the relationships of the direct and indirect effects were in opposite directions. This finding is somewhat puzzling. In the case of academic ability, when the relatively strong positive indirect effect (beta = .161) that was mediated primarily through GPA and educational aspirations was combined with the negative direct effect of lower magnitude (beta = -.047), the total effect remained positive and significant. However, in the case of gender, the direct effect (beta = -.038) and the indirect effect (beta = .040) virtually cancelled each other out, and thereby left the total effect of gender on persistence small and insignificant. Most of the relevant literature has confirmed that gender has very little to do with persistence behavior at

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four-year institutions (Baker & Vélez, 1996; Tinto, 1993). It is unclear why the direct effects of both academic ability and gender on persistence were negative in this analysis.

The variable in the path diagram that showed the third highest total effect on system persistence was "percentage full-time enrollment" (beta = .155) and most of the effect from that variable was attributable to its direct positive effect (beta = .122). A similar finding was reported by Metzner and Bean (1987) who found a significant direct effect between the variable "hours enrolled" and dropout behavior.

Although the contribution of indirect effects of this variable on persistence was relatively low (beta = .033), one might note that percentage full-time enrollment did have a fairly high direct positive effect (beta = .221) on the intermediary variable involvement, which, from a theoretical point of view could be interpreted to mean that full-time attendance increases the likelihood that a student would become involved with the academic and social aspects of the college community (Astin, 1984; Tinto, 1993). Alternatively, it might also imply that part-time students have other responsibilities and/or activities that are competing for their time and interest, which, in turn, would decrease their involvement on campus (Astin, 1996; Pascarella, 1980).

Of the two variables included in the path diagram that represented "pull factors", only "hours worked" showed any significant relationship to persistence. All the effect of hours worked on persistence was realized through a small, but significant negative indirect effect (beta = -.017). This outcome was interpreted to mean that increasing the hours a student works while going to school could have an impact on factors that, in turn, could negatively impact persistence. It is noteworthy that the indirect effect of hours worked was mediated through the intermediary variable percentage full-time enrollment (via a path that was added during model modification), which in turn, had a significant impact on persistence including some indirectly through involvement.

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The literature related to the relationship of hours worked to attrition has primarily assessed the impact of full-time employment. In addition, most of these studies have focused on off-campus work. Given this fact, however, there has been fairly strong support from the literature that full-time work, especially when that work is off-campus, can have a negative impact on persistence (Astin, 1993; Ehrenberg & Sherman, 1987; Pascarella & Terenzini, 1991; Tinto, 1993). The way in which hours worked has an effect on persistence (i.e., directly versus indirectly), however has not been studied very much. When Anderson (1981) analyzed a national database using causal modeling techniques, she found that the effect of hours worked on system persistence was direct, and that the effect was not mediated through intermediary variables, an outcome which was contrary to the findings of this study. However, the key variable providing the mediating effect in this study, percentage full-time enrollment, was not included in Anderson's study.

The variable "involvement at initial institution" also had a significant total effect on five-year system persistence (beta = .151). This effect was both direct (beta = .098) and indirect (beta = .053), a finding which supports the underlining theoretical perspective that student involvement (and/or integration and/or interaction) helps promote persistence (Astin, 1984, 1993; Bean 1990; Tinto, 1975, 1993). The indirect effects of involvement on persistence were mediated by subsequent educational aspirations, scholastic performance (GPA), satisfaction, and transfer status.

From a theoretical perspective, the indirect effect through subsequent educational aspirations found in this study was akin to the causal link typically associated with Tinto's model of student departure that suggests that academic integration influences subsequent goal commitment, which, in turn, affects persistence. A meta-analysis of studies testing Tinto's theory, however, indicated only moderate support for that indirect relationship (Braxton et al., 1997).

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The mediating effect of GPA in the relationship between involvement and persistence as found in this analysis was consistent with the research and writings of Spady (1970), Bean (1983, 1990), and Astin (1993). The results, however, could not be adequately compared to Tinto's model (of student departure) because Tinto's model includes GPA as a component (i.e., indicator) of the integration construct, not as a separate variable (Tinto, 1975, 1993). Despite this operational difference, however, Tinto's theory would support the contention that higher GPAs "indicate" greater academic integration, which in turn can impact persistence. No empirical evidence (excluding that from this investigation) was found to support or to refute the finding of indirect effects of involvement on persistence mediated through GPA.

In a similar fashion, it does not appear that the mediating effects of both satisfaction and transfer status in the causal link between involvement and persistence have been tested elsewhere to the extent required to permit adequate comparisons to the literature.

It is interesting to note (in Figure 2) that even though involvement functioned to some degree as an intermediary variable for practically every variable feeding into it in the causal design, the variance explained in involvement, itself, was only 8%. This result implies that although involvement appears to be significant as an antecedent to persistence, it is likely that there may be factors contributing to and affecting involvement that are not currently included in the modified eclectic model to explain system persistence as presented in Figure 2.

Because the direct link from the variable "student satisfaction at their initial institution" to persistence was dropped during the process of model modification, all the effects of satisfaction on persistence were mediated through the variable "transfer status". Although this positive indirect effect was statistically significant, the magnitude was relatively small (beta = .019). This result is similar to the findings of Bean (1980), when he applied his model to men, and to those of Metzner and Bean (1987). It is worthy to note that only one-half of one percent of the variance in the satisfaction variable was explained by the model.

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It was not possible to find any research that investigated the relationship between satisfaction levels and actual transfer behavior that could be referred to for comparative purposes. Although Astin (1993) did report a correlation between "left school or transferred" and satisfaction measures, he did not distinguish between students who had left school without transferring and those who had transferred and then had persisted at another institution. Despite the lack of previous research, it nevertheless makes sense intuitively that if a student experiences low levels of satisfaction at an institution, then he or she may be more likely to transfer to another institution.

In addition to functioning as an intermediary variable between satisfaction and persistence, transfer status also served to mediate the indirect effects of academic ability (added path), involvement (added path), and subsequent educational aspirations (added path) on system persistence. Transfer status was found to have a significant direct negative effect on persistence behavior (beta = -.118). No examples of other studies where transfer status had been integrated into a causal model to explain persistence could be found for comparative purposes.

Conclusions

The major conclusions are summarized as follows:

1. Many of the factors demonstrated to be associated with system-wide persistence in the current study are similar to those that have been shown to help explain institutional departure behavior. In particular, the findings suggest that the background variables age, socioeconomic status, and ability, plus educational aspirations, percentage of full-time attendance, hours worked at a job, scholastic achievement, and student involvement can all to a various extent help explain system persistence.

2. A modified eclectic path analytic model incorporating in a selective way variables from an existing database was judged to provide an adequate degree of goodness-of-fit to afford a

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basis for an initial interpretation of both direct and indirect (mediating) effects of key variables in explaining the persistence of students seeking the bachelor's degree in the four-year postsecondary educational system. Cross-validation studies are needed to sustain any conclusions regarding the modified eclectic model.

3. This study suggests that if a student transfers after beginning a baccalaureate degree program at a four-year institution, he or she would be somewhat less likely to persist for five years toward obtaining a bachelor's degree in four-year institutions.

4. Student satisfaction levels would appear to have a significant impact on the decision to transfer from one institution to the other, but to have little if any direct relationship to persistence in completing the bachelor's degree.

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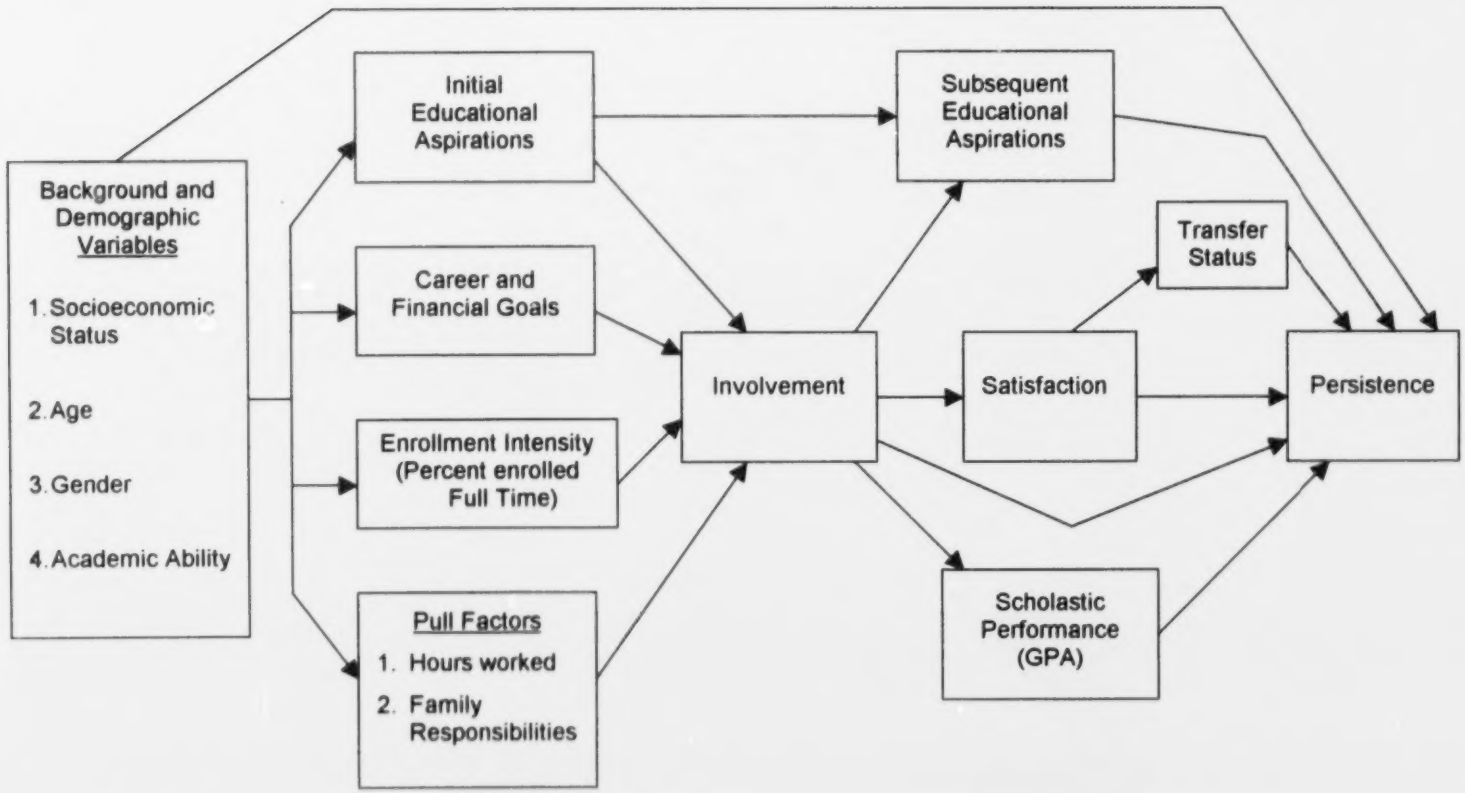

Figure 1. Hypothesized Eclectic Model of System Persistence

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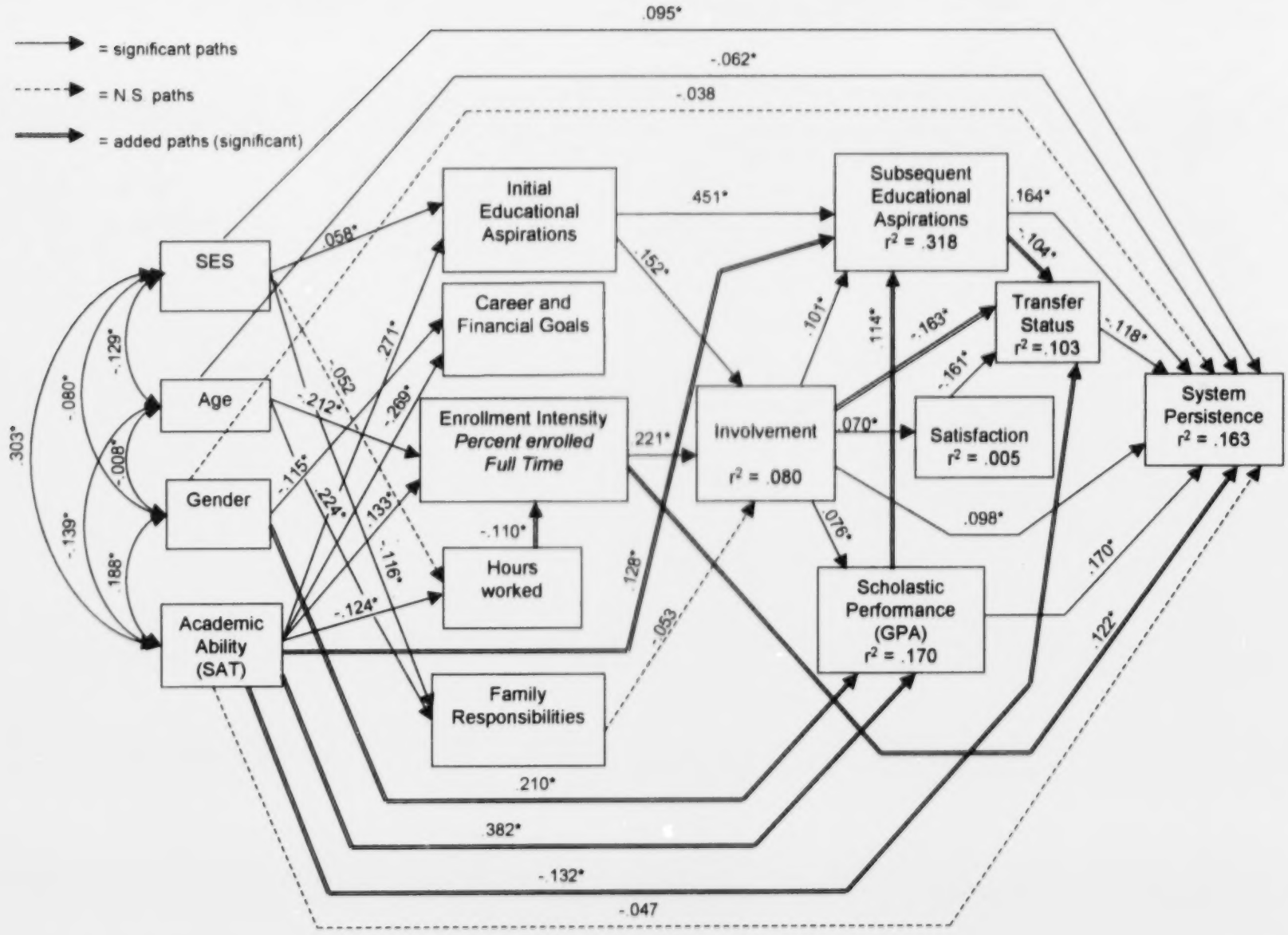

Figure 2. Modified Eclectic Model of System Persistence

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Table 1

The Direct, Indirect, and Total Effects of Input Variables on Five-Year System Persistence

	Degree of Relationship to System Persistence[a]		
Variable	*Direct effects*	*Indirect effects*	*Total effects*
SES	.095*	.008*	.103*
Age	-.062*	-.035*	-.097*
Gender	-.038	.040*	.002
SAT score	-.047*	.161*	.114*
Initial Ed Aspirations	--	.102*	.102*
Career/Financial Goals	--	--	--
% Enrolled FT	.122*	.033*	.155*
Hours worked	--	-.017*	-.017*
Family Responsibilities	--	-.008	-.008
Involvement at initial inst.	.098*	.053*	.151*
Subsequent Ed. Aspirations	.164*	.012*	.176*
GPA	.170*	.020*	.190*
Satisfaction at initial inst.	--	.019*	.019*
Transfer Status	-.118*	--	-.118*

[a]Degree of relationships indicated by standardized path coefficients.

*$p < .05$